

SOME NEW CHIRONOMIDAE FROM SOUTH AND MIDDLE ANDAMAN ISLANDS, INDIA (DIPTERA: CHIRONOMIDAE)¹

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(With four text-figures)

Key words: Diptera, Chironomidae, Andaman Islands, India

Little information is available on the Chironomidae of the Andaman and Nicobar Islands. Two new genera, namely *Indoaxarus* gen. nov., *Andamanus* gen. nov. and one new species *Lindebergia kadamtullaensis* sp. nov. are being described.

INTRODUCTION

Lindebergia Tuiskunen is a monotypic genus, based on a single male specimen, *L. bothnica* Tuiskunen. The taxonomic status of the genus was doubtful. Its independent taxonomic status is being established by cladistic analysis in this paper. A new species *L. kadamtullaensis* sp. nov. is also described. Two new genera and species namely *Andamanus manii* gen. nov., sp. nov. and *Indoaxarus santokhi* gen. nov., sp. nov. are also being described from Andaman and Nicobar Islands.

The structure and terminology of Saether (1980) has been followed.

Subfamily: Orthoclaadiinae
Genus *Andamanus* gen. nov.

Diagnosis: Habitat: Intertidal zone along the shoreline. Medium sized, pedicel rounded with two setal patches, antennal ratio 0.531, coronal suture incomplete, anteprenotal lobes with dorsal notch, acrostichals absent, costa not extending beyond the tip of R_{4+5} . Claws curved, pulvilli absent, spermatheca single with neck, ramus weak and short, intergonocoxal membrane present, gonapophysis VIII is divided into dorsal

ventral and median lobes. Cercus setose and triangular.

Andamanus manii gen. nov. sp. nov.
(Figs 1a-e)

Description: Female Imago: Total body length 2.51 mm; wing length 1.88 mm.

Antenna: Scape poorly developed; pedicel rounded with two setal patches, anterior setal patch with 6-7 setae and posterior with 5-7 setae. Length/width of 1st-4th flagellomeres: 0.136/0.033; 0.077/0.025; 0.077/0.022; 0.154/0.022 mm. First flagellomere larger than 2nd and 3rd, with two beaded structures, two whorls of setae, one on each. Second and third flagellomeres conical, each with a single whorl of 5-8 setae. Ultimate flagellomere beaded, broad based with a whorl of three setae on distal end. Antennal Ratio (AR) 0.531.

Head: Coronal suture incomplete, 0.109 mm long; temporal setae 20, frontal tubercle absent, eyes bare, bean-shaped, with weak dorsal extension. Length and width of clypeus 0.060 and 0.065 mm, clypeus bears 28 setae. Maxillary palps with five palpomeres, length/width: 0.026/0.021; 0.039/0.034; 0.104/0.030; 0.113/0.026; 0.217/0.017 mm. Tentorium tube, sieve tube, sieve pore present, cornua blunt, orifice rounded; labial lonchus elongated with rounded proximal end. (Fig. 1a)

Thorax: Anteprenotal lobe reaching the projection of scutum, joining medially with a

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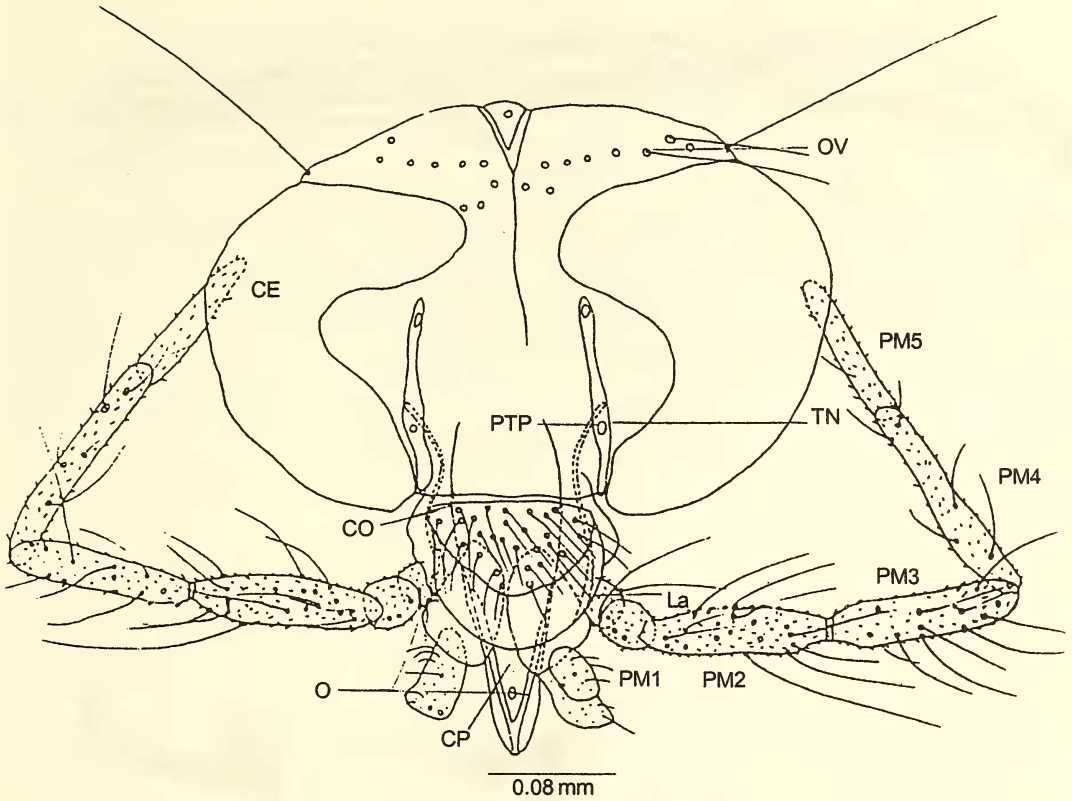


Fig. 1a: *Andamanus manii*: Head

narrow notch, bare. Dorsocentralis 18-20 in a single row. Acrostichals absent, scutellum with 11-13 scutellars.

Wings: Subcosta short, ending before R_1 , R_1 ending distal to $r-m$, R_{2+3} very weak. Costa not extending beyond the tip of R_{4+5} . Squama not fringed (Fig. 1c).

Legs: Fore tibial apex with a blunt scale, spur absent, claws curved. Mid tibial apex with two combs, dorsal complete with a single spur, ventral with a peg-like spur. Length of spurs 0.040 and 0.018 mm. Hind tibial apex with a single comb including 0.063 mm long spur. Pulvilli and empodium absent.

Female Genitalia: Spermatheca single, elongated, with neck, spermathecal duct opens independently into spermathecal eminence. Notum

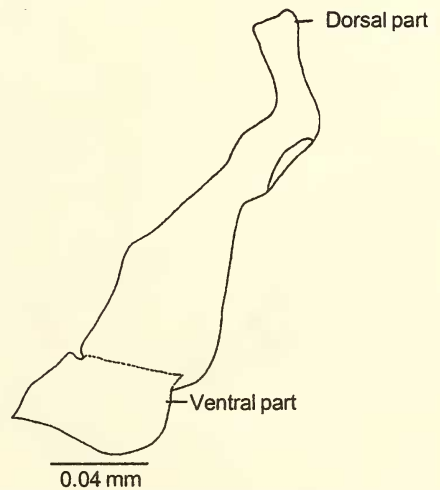


Fig. 1b: *Andamanus manii*: Anteroprotonotum lobe

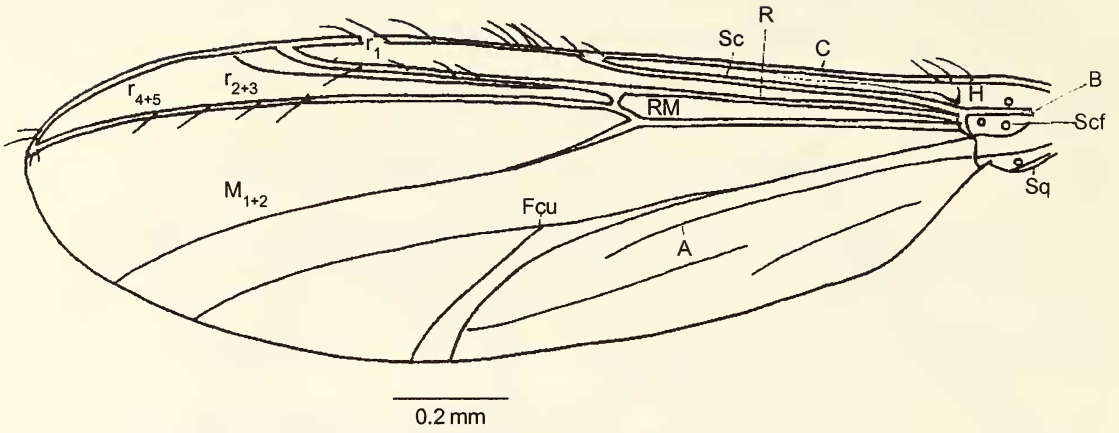


Fig. 1c: *Andamanus manii*: Wing

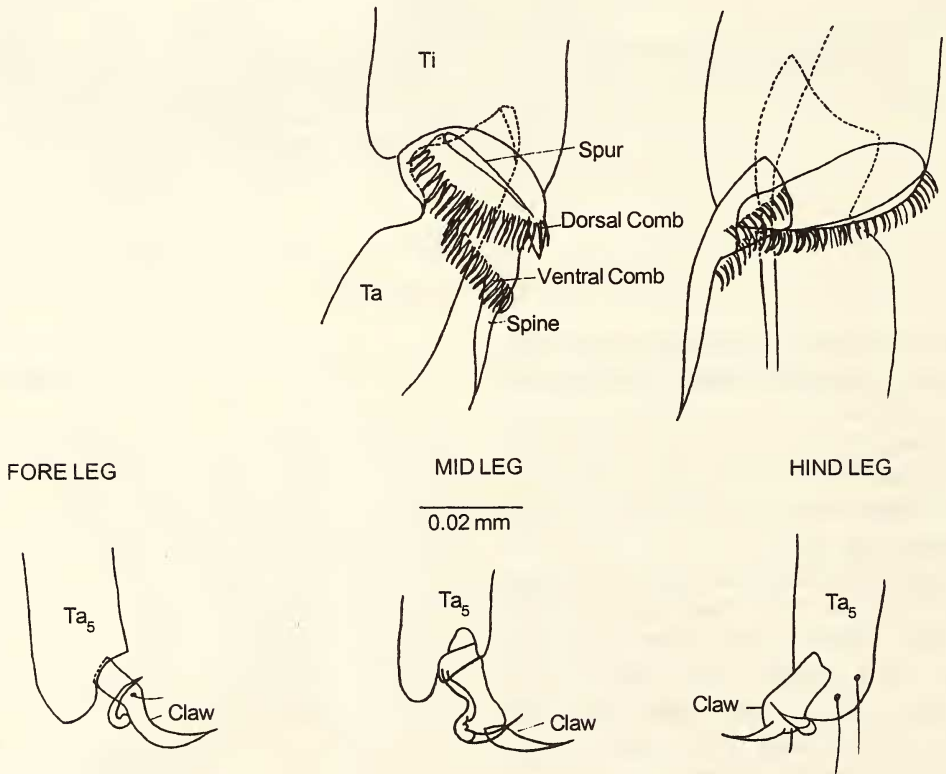


Fig. 1d: *Andamanus manii*: ♀ legs (First row: tibial apex, second row: fifth tarsal)

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TABLE I
MEASUREMENTS OF LEGS (IN MM) AND LEG RATIO (LR) OF *ANDAMANUS MANII*

	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
P ₁	0.872	0.631	1.095	0.5568	0.445	0.363	0.159	1.735
P ₂	1.063	0.963	0.681	0.3891	0.340	0.200	0.113	0.707
P ₃	0.927	0.877	0.436	0.263	0.204	0.136	0.090	0.497

elongated, ramus weak and short. Labia elongated with microtrichia. Postgenital plate broad, rounded. Intergonocoxal connective membrane present. Gonapophysis VIII setose divided into dorsal, ventral and median lobes. Gonocoxal apodeme extending to proximal end of coxosternapodeme. Cercus setose and triangular (Fig. 1e).

Type locality: Mayabunder, Middle Andaman; Andaman and Nicobar Is.; India.

Etymology: Named after Prof. M.S. Mani, the founder of School of Entomology.

Holotype: 1 ♀ Mayabunder, Middle Andaman, 21.xii.1983, Coll. G. Maheshwari. Deposited in the collection of School of

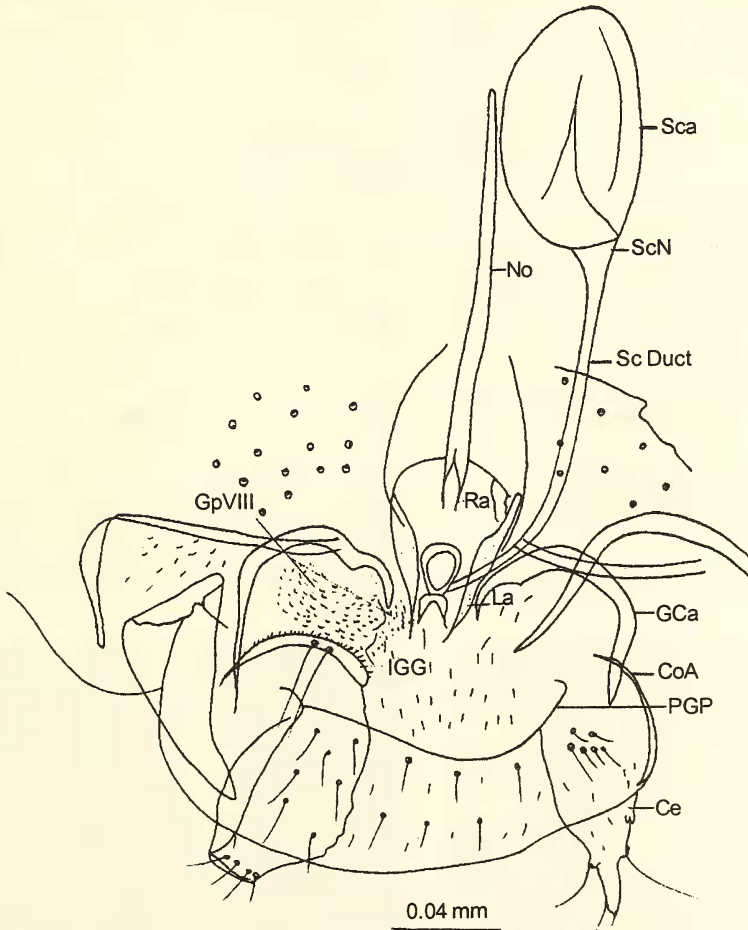


Fig. 1e: *Andamanus manii*: ♀ Genitalia

Entomology, St. John's College, Agra; India, (Regn. No. Ch. 21).

Paratype: Regn. No. Ch. 21a, one ♀, same data as holotype.

Systematics: The new genus *Andamanus* resembles the genus *Halocladius* Hirvenoja from the coastal brackish waters of the Holarctic Region. It also has certain affinities with *Cricotopus* v.d. Wulp and *Paracladius* Hirvenoja. *Halocladius*, *Cricotopus* and *Paracladius* can be distinguished from *Andamanus* gen. nov. by the presence of a decumbent dorsocentralis. *Paracladius* can be separated by prealars not extending anterior to level of median anepisternum II and bare mediolongitudinal area of tergite. *Cricotopus* and *Halocladius* can also be distinguished from *Andamanus* gen. nov., by hairy eyes. Female of *Andamanus* gen. nov. can be identified by a combination of characters: scape poorly developed, coronal suture incomplete, frontal tubercles absent, eyes bare, sieve pores present, anteprenotal fused dorsally, subcosta short and ending before R_1 , pulvilli and empodium absent, spermatheca single, elongated with spermathecal neck.

Remarks: Adults were found gyrating on the water surface in the intertidal zone.

Subfamily: Orthoclaadiinae
Genus *Lindebergia* Tuiskunen

Lindebergia Tuiskunen, *Ann. ent. Fenn.* 50:121

Diagnosis: *Lindebergia* Tuiskunen is a monotypic genus known only for *L. bothnica*. A single adult male was collected from the northern shore of the Gulf of Bothnia, Finland. It is characterised by 13 flagellomeres, sensilla chaetica on flagellomere 2, 3 and 13. Eyes bare without dorsomedial extension. Palp without sensilla clavata. Squamae bare. Pulvilli small. Pars ventralis present, gonostylus narrow without crista dorsalis, broad megaseta present.

Lindebergia kadamtullaensis sp. nov.
(Figs 2a-f)

Description: Male Imago: Body length 2.39 mm, wing length 1.397 mm, wing width 0.397 mm, body length : wing length is 1.71:1.0.

Antenna: Scape well developed and bare, pedicel covered with microsetae, flagellum with 13 flagellomeres, a median groove extends between 3rd and ultimate flagellomeres, distribution of setae from 1st to ultimate flagellomeres is 2-4, 9-11, 10-11, 10-12, 11-13, 8-10, 10-12, 11-13, 7-10, 10-11, 9-11, 10-12 and 75-85 respectively. Length and width of pedicel 0.88 and 0.114 mm. Length and width of flagellomeres 1st-13th (in mm): 0.047, 0.025; 0.018, 0.025; 0.025, 0.025; 0.025, 0.022; 0.025, 0.023; 0.029, 0.020; 0.031, 0.018; 0.033, 0.018; 0.035, 0.018; 0.036, 0.016; 0.036, 0.014; 0.036, 0.016; 0.321, 0.016. Antennal ratio (AR) 0.853.

Head: Coronal suture complete, 0.166 mm long, frontal tubercle present, temporal setae 5 (2 frontals, 3 post orbitals). Eyes bare without dorsal extension. Length and width of clypeus 0.051 and 0.099 mm respectively, with 18-22 setae. Maxillary palp with five palpomeres, length and width of palpomeres: 0.018, 0.014; 0.033, 0.020; 0.073, 0.018; 0.121, 0.16; 0.11, 0.016 mm respectively. Tentorium arm tubular, anterior tentorium pit and sieve pores absent; stipes narrow, cornua blunt and curved, orifice not seen, labial lonchus elongated and porous (Fig. 2a).

Thorax: Anteprenotal lobes meeting dorsally, anteprenotal 3-5; scutal tubercle absent, acrostichals absent; dorsocentralis in two rows, 8-12 in each row. Scopula thoracalis present; prealars not seen, humerals 2-4; scutellars in two rows, 5-7 in each row. Preepisternals 7-9; anepisternals 2-3; median anepisternal II absent.

Wings: Arculus bare, sensilla campaniformia present, alula poorly developed. Costa extending well beyond the tip of R_{4+5} ; subcosta short, reaching the middle of R_{2+3} ; R_1

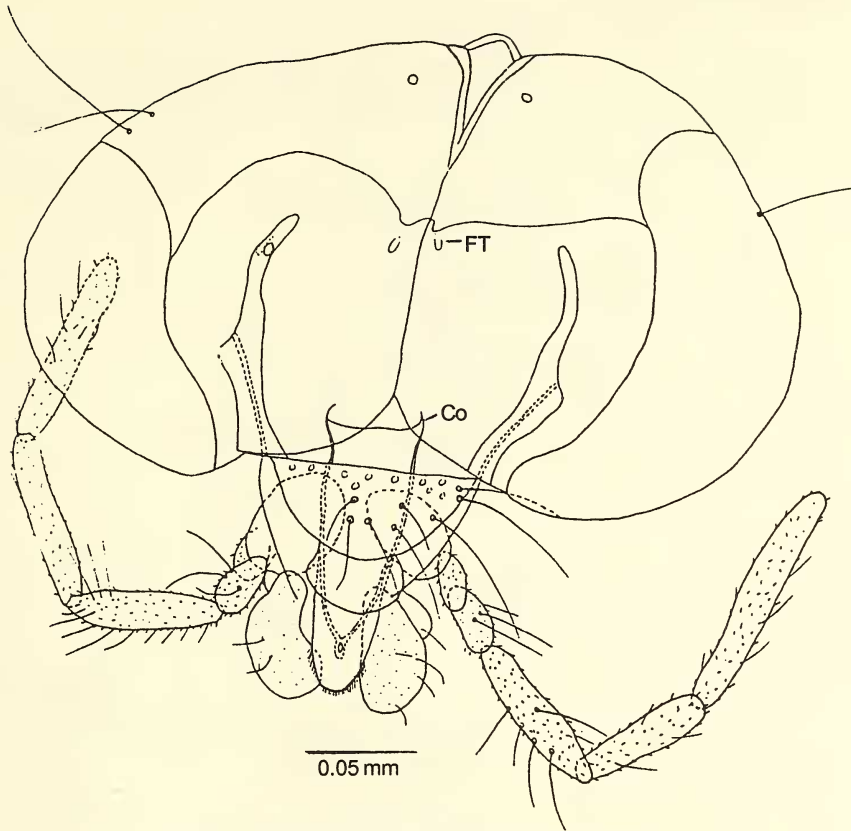


Fig. 2a: *Lindebergia kadamtullaensis*: Head

proximal to Cu_1 ; R_{2+3} terminates near R_{4+5} ; R_{4+5} terminates slightly distal to Cu_1 ; $r-m$ proximal to cubital fork; Cu_2 curved sharply (Fig. 2b).

Legs: Fore femur with a scale at distal inner margin; tibia with a single spur (0.054 mm long), comb absent. Empodium absent, claws slightly curved. Middle tibia with two spurs, outer spur 0.023 mm and inner spur 0.019 mm long. Pulvilli, arolium and empodium absent. Hind tibial apex with a row of 12-15 strong setae, each tibia with two spurs, inner 0.020 mm and outer 0.054 mm long (Fig. 2c).

Male genitalia: Anterior end of abdominal segment VIII strongly narrow, posterior end broad, typically triangular. Anal tergal band V-type, reaching the base of aedeagus. Superior

volsella almost tongue shaped, setose. Pars ventralis very well developed with 6-8 marginal setae. Anal point broad, reaching the middle of gonocoxite. Gonostylus short, folded anteriorly and of peculiar shape (distal end broad with crista dorsalis), distal end rounded and broad. Crista dorsalis and megaseta present; megaseta rod shaped. Paraphallic ratio 2.62.

Female Imago: Total body length 2.58 mm, Head length 0.173 mm.

Antenna: Scape well developed, pedicel covered with microtrichia. Flagellum with five flagellomeres, each bearing 3, 4, 6, 5, 8 setae respectively.

Head: Coronal suture complete, 0.159 mm long. Frontal tubercle present, temporal setae

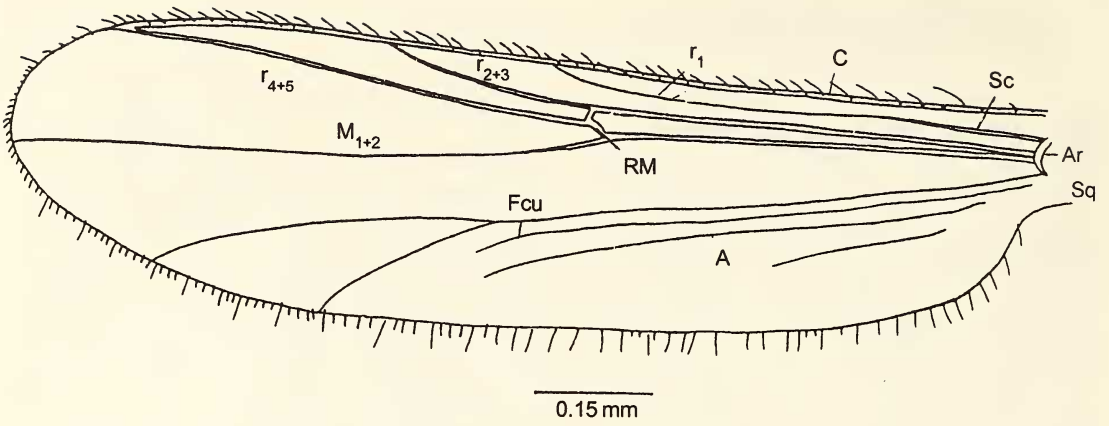


Fig. 2b: *Lindebergia kadamtullaensis*: Wing

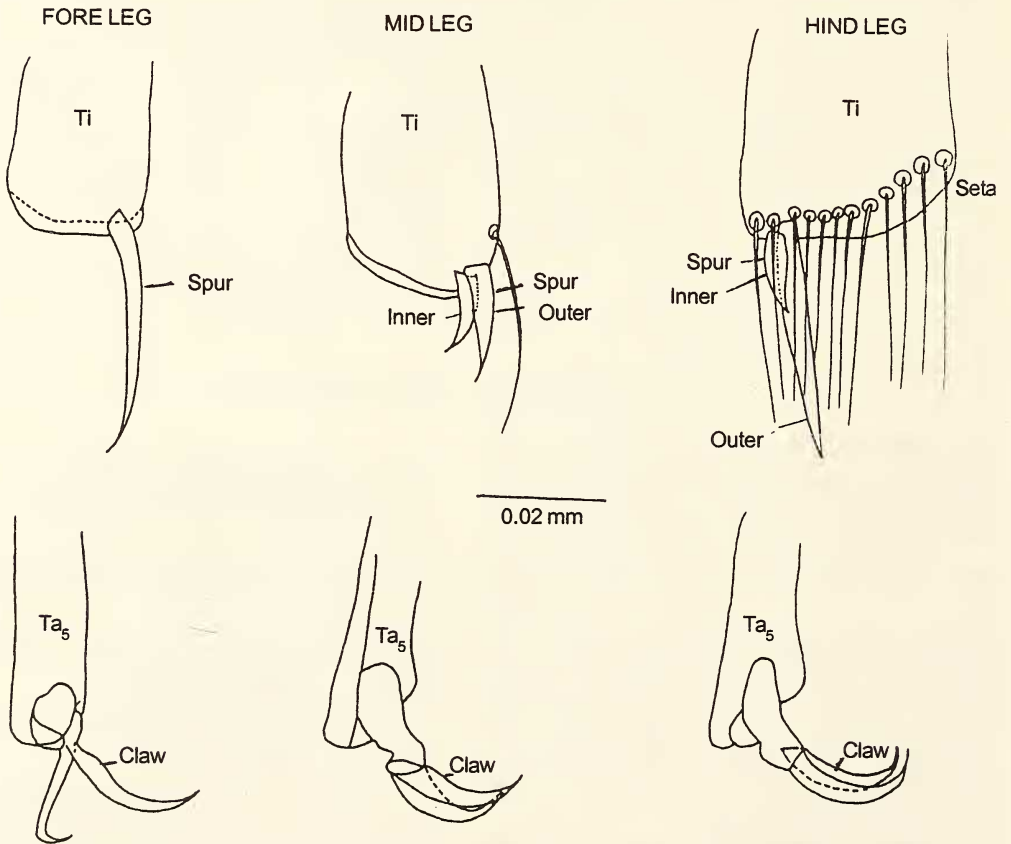


Fig. 2c: *Lindebergia kadamtullaensis*: ♂ Legs (First row: tibial apex, Second row: fifth tarsal)

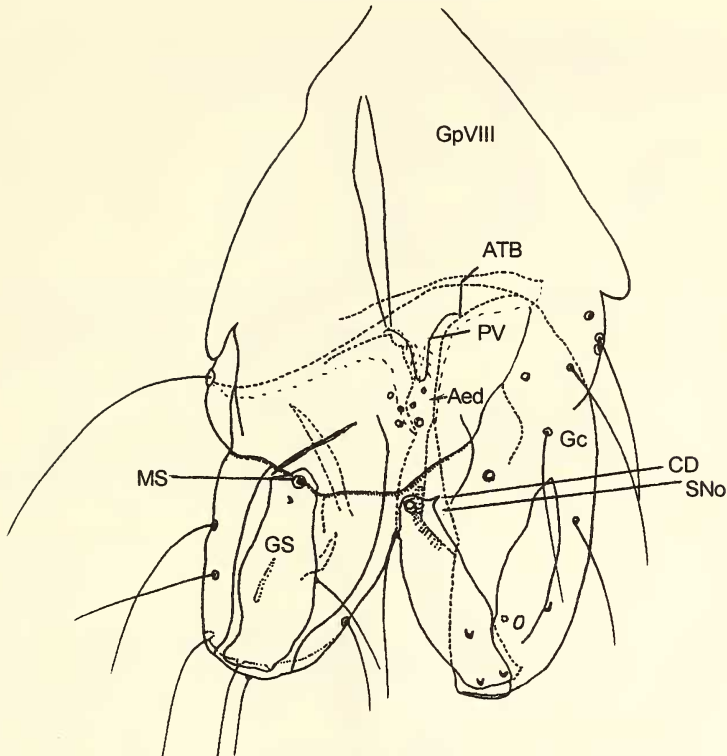


Fig. 2d: *Lindebergia kadamtullaensis*: ♂ Genitalia

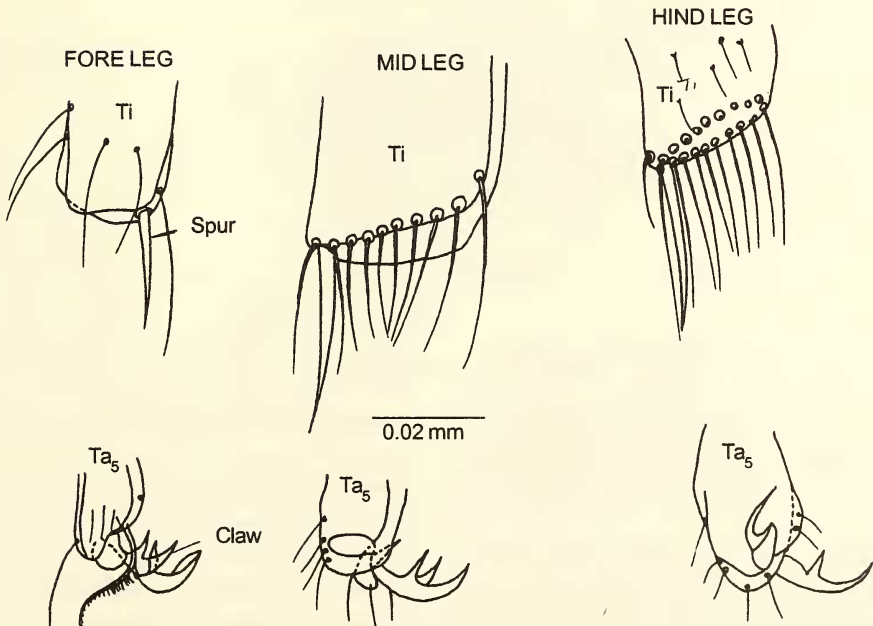


Fig. 2e: *Lindebergia kadamtullaensis*: ♀ Legs (First row: tibial apex, Second row: fifth tarsal)

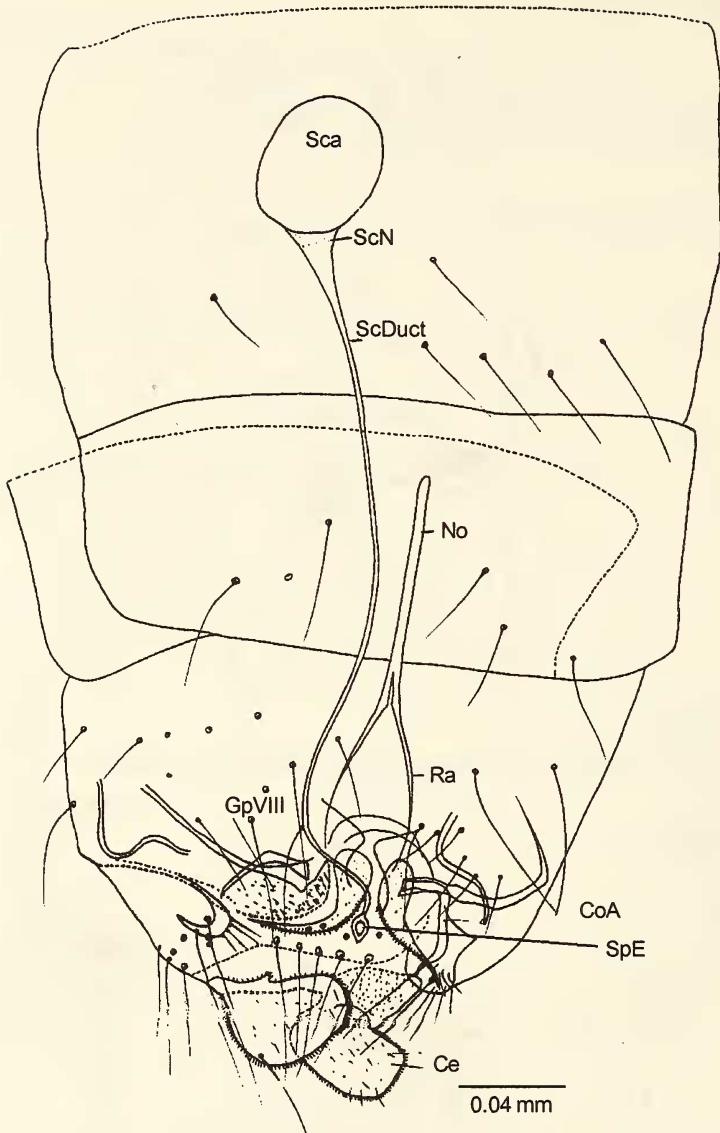


Fig. 2f: *Lindebergia kadamtullaensis*: ♀ Genitalia

4-6; eyes bare without dorsal extension. Maxillary palps five. Tentorial arm tubular, sieve pore absent, stipes narrow, cornua blunt and curved.

Thorax, Wing and Legs: Same as male.

Female genitalia: Spermatheca single, situated in abdominal segment VII, almost oval, with a distinct neck; spermathecal duct straight.

Notum very well developed. Ramus forked at anterior margin of tergite IX, extending posteriorly to labia. Coxosternapodeme S-shaped. Labia comma shaped, covered with microtrichia. Spermathecal duct opens into spermathecal eminence without any modification. Gonocoxal apodeme straight. Gonapophysis VIII well developed, divided into dorsal and ventral lobes,

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TABLE 2
MEASUREMENTS OF LEGS (IN MM) AND LEG RATIO (LR) OF *LINDEBERGIA KADAMTULLAENSIS*

	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
P ₁	0.5527	0.713	0.363	0.218	0.150	0.081	0.072	0.51
P ₂	0.540	0.577	0.277	0.140	0.104	0.063	0.065	0.48
P ₃	0.572	0.690	0.395	0.195	0.159	0.077	0.075	0.57

setose. Gonocoxite IX lobe shaped, covered with microtrichia. Postgenital plate triangular, bears setae. Gonostylus IX not visible, cercus flap-shaped, covered with microtrichia and macrotrichia.

Type locality: Kadamtulla seashore, Middle Andaman; Andaman and Nicobar Is.; India.

Etymology: Named after the site of collection, Kadamtulla.

Holotype: 1 ♀ Kadamtulla, Andaman and Nicobar Is., Coll. G. Maheshwari; deposited in the collection of School of Entomology, St. John's College, Agra, India. Regn. No. Ch. 22.

Paratypes: 1 ♂, 3 ♀ ♀, (Regn. No. Ch. 22a, Ch 22b, Ch. 22c and Ch. 22d respectively) data same as holotype.

Systematics: The validity of the genus was not certain so far (Tuiskunen 1984). By describing one more species, *Lindebergia kadamtullaensis*, from the shore of Kadamtulla, Middle Andaman, from 2 male and 3 female specimens, the genus can be given validity. *L. kadamtullaensis* sp. nov. is closely related to *L. bothnica*, but can be distinguished by straight broad gonostylus with crista dorsalis and rod-shaped megaseta, pars ventralis long, broad anal point and strong triangular abdominal segment VIII. Female genitalia are described in detail.

Ecology: All specimens were collected from the rocky shoreline near Kadamtulla guest house, using Diptera net having a mesh size of 50-80µ. One female was collected using an aspirator. Immature stages of the species are not known.

Subfamily: Chironominae

Tribe: Chironomini

Genus *Indoaxarus* gen. nov.

Diagnosis: Habitat: Coastal ponds and lakes. Medium sized, scape poorly developed, eleven flagellomeres, male antenna poorly plumose, frontal tubercle absent, anteprenotal lobe bare and fused medially. Squamae bare, sensilla campaniformia present, *r-m* oblique, cubital fork distal to *r-m*. Foretibial apex with blunt scale, empodium serrated; middle tibial apex with two combs, each with movable spine. Anal tergal bands V-type, phallapodeme subulate, anal point T-shaped, strongly curved ventrally, superior volsella S-type, inferior volsella bearing falciform setae, median volsella lobe-like. Gonostylus directed posteriorly, crista dorsalis and megaseta absent.

Etymology: Since the material was collected from India and bears close affinities to *Axarus*, the genus has been named *Indoaxarus*.

Indoaxarus santokhi sp. nov.

(Figs 3a-d)

Description: Male Imago: Medium sized, total length 3.017 mm, wing length 2.183 mm, wing length: wing width 4.56: 3.61.

Antenna: Scape poorly developed; flagellum with 11 flagellomeres; flagellum poorly plumose; 2nd to 10th flagellomeres almost equal, distribution of setae on flagellomeres, 5-6, 8-9, 9-10, 9-11, 9-10, 10-11, 10-11, 10-11, 1-9, 9-11, 3-5; ultimate flagellomere with 40-50 bristles. Last flagellomere longer than combined length

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of rest of flagellomeres. A median groove present from first to last flagellomere. Length and width of pedicel 0.09-0.13 mm respectively. Length and width of flagellomeres, 1st - 11th: 0.088, 0.033; 0.029, 0.033; 0.025, 0.033; 0.033, 0.029; 0.025, 0.029; 0.025, 0.029; 0.029, 0.029; 0.02, 0.029; 0.025, 0.025; 0.025, 0.025; 0.564, 0.025 respectively. Antennal ratio (AR) 1.714.

Head: Coronal suture complete, 0.234 mm long; temporal setae 14-16 (including post orbitals), frontal tubercle absent; eyes bare; clypeus with 14 clypeals, length/width 0.065, 0.082 mm respectively. Maxillary palps with five

palpomeres, average length/width of palpomeres 0.032/0.21; 0.037/0.26; 0.104/0.026; 0.084/0.021; 0.151/0.016 mm respectively. Tentorium arm tube-like, posterior tentorial pit distal, sieve pore absent, anterior tentorial pit well developed, stipe tubular, length and width 0.087, 0.021 mm respectively. Cornua blunt, orifice oval, labial lonchus elongated with rounded proximal end. (Fig. 3a)

Thorax: Anteprenotal lobe reaching the projection of scutum, meeting medially, bare; scutal tubercle present, bare; acrostichals four; dorsocentralis eight in a single row; humeral one;

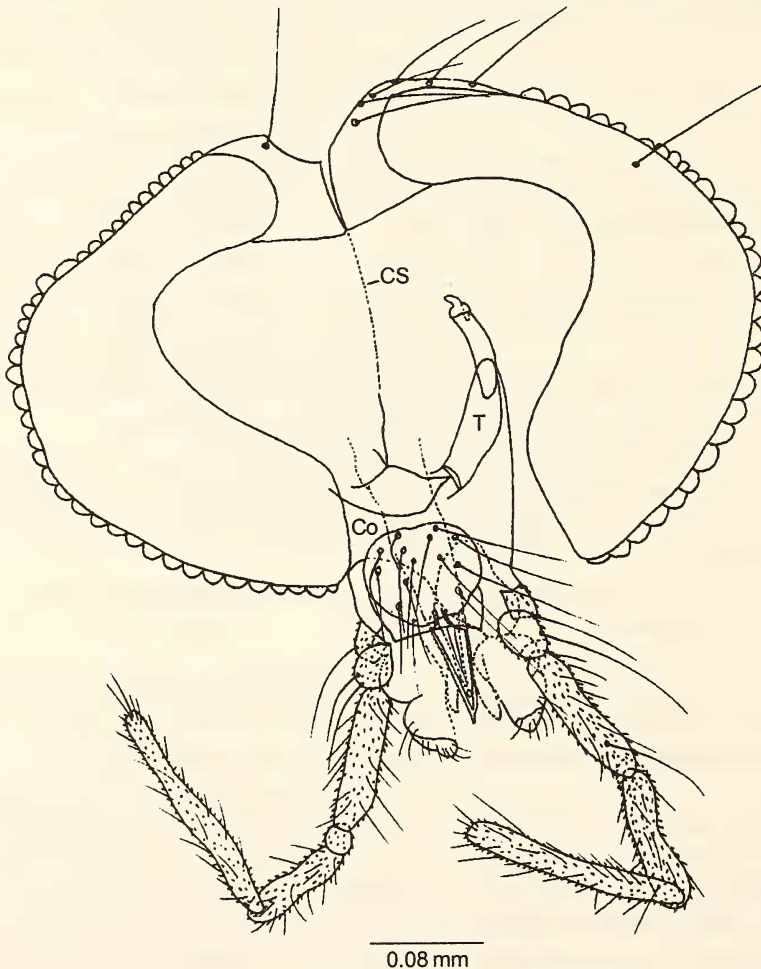


Fig. 3a: *Indoaxarus santokhi*: Head

prealars two, scutellars 7-9, preepisternals 6-8; anepisternal suture complete; anepisternal 1-3.

Wing: Squamae bare, tegula small and triangular with a single seta; brachiolum with microtrichia and two setae; humeral plate square with microtrichia; scopula alaris covered with dense macrotrichia; axillary sclerites (III) with 2-3 setae, venarum ratio (VR) 0.408, sensilla campaniformia present; costa extends up to tip of R_{4+5} ; subcosta terminates distal to $r-m$; radius with 12-14 setae, R_1 and R_{2+3} bare, R_{2+3} terminates near R_1 , R_{4+5} straight, making a round with costa, R_{4+5} bare; $r-m$, oblique, media straight, ends distal to Cu_1 , $m-cu$ absent, cubital fork distal to $r-m$, Cu_2 straight. (Fig. 3b)

Legs: Fore leg elongated, tibial apex with a blunt scale, first tarsal longer than tibia; fifth tarsal with a pair of highly curved claws. Empodium serrated and elongated; middle tibial apex with two combs, each with movable spine; dorsal scale present. Hind tibial apex bears dorsal and ventral combs (30-34 and 14-17 setae respectively), each containing a spur; ventro-lateral margin with pectinate scale, with two tiers of serrated structures (Fig. 3c).

Male Genitalia: Anal tergal bands V-type, reaching the base of anal point, lateral sternapodeme slightly curved, transverse sternapodeme broad; phallapodeme subulate,

coxapodeme straight, anal point broad distally, bare; T-shaped, very strongly curved ventrally, aedeagal setal patch with 11-16 setae; superior volsella S-type, bare, reaching up to 5/6th length of inferior volsella. Inferior volsella elongated lobe-shaped, bearing falciform setae. Median volsella broad, rounded, lobe-like, bearing microtrichia, reaching middle of inferior volsella. Gonocoxite with broad base, triangular in shape; gonostylus directed posteriorly, narrow base, elongated, pointed distally, distal inner margin with 13-17 subulate setae. Crista dorsalis and megaseta absent. Paraphallic ratio 0.32 (Fig. 3d).

Type locality: Port Blair, South Andaman; Andaman and Nicobar Is.; India.

Etymology: Named after Dr. Santokh Singh, one of the pioneers of high altitude entomology.

Holotype: ♂ labelled Port Blair, Pond near Fire Brigade Station, 29.xii.1983, Coll. G. Maheshwari. Deposited in the collection of School of Entomology, St. John's College, Agra, India (Regn. No. Ch. 23).

Paratypes: 4 ♂♂, (Regn. No. Ch. 23a-d) data same as holotype.

Systematics: *Indoaxarus* gen. nov. resembles *Axarus* Roback and *Xenochironomus* Kieffer. *Xenochironomus* can be distinguished by antepnotal lobes dorsally separated, scutum

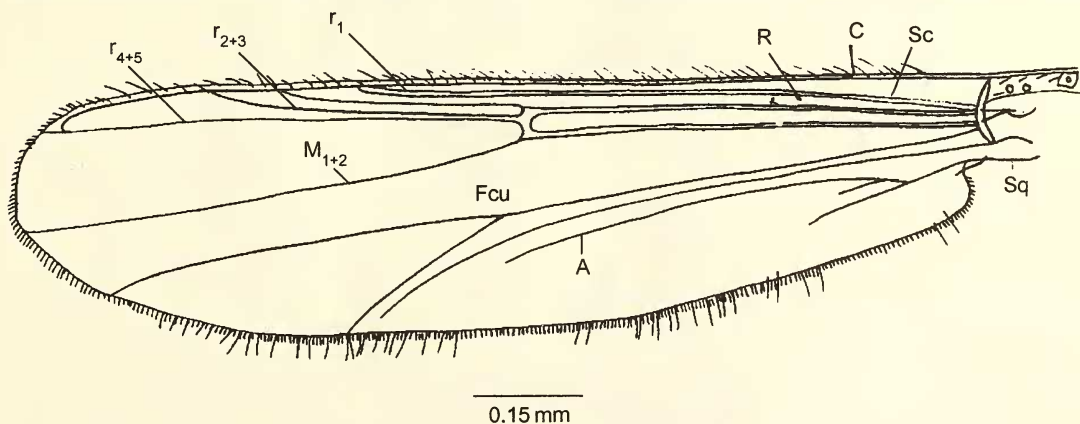


Fig. 3b: *Indoaxarus santokhi*: Wing

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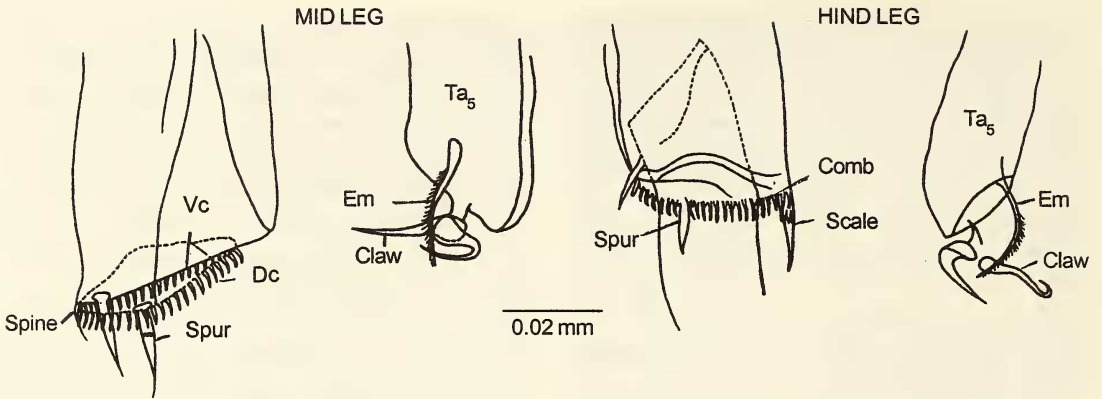


Fig. 3c: *Indoaxarus santokhi*: ♂ Legs (First row: tibial apex, Second row: fifth tarsal)

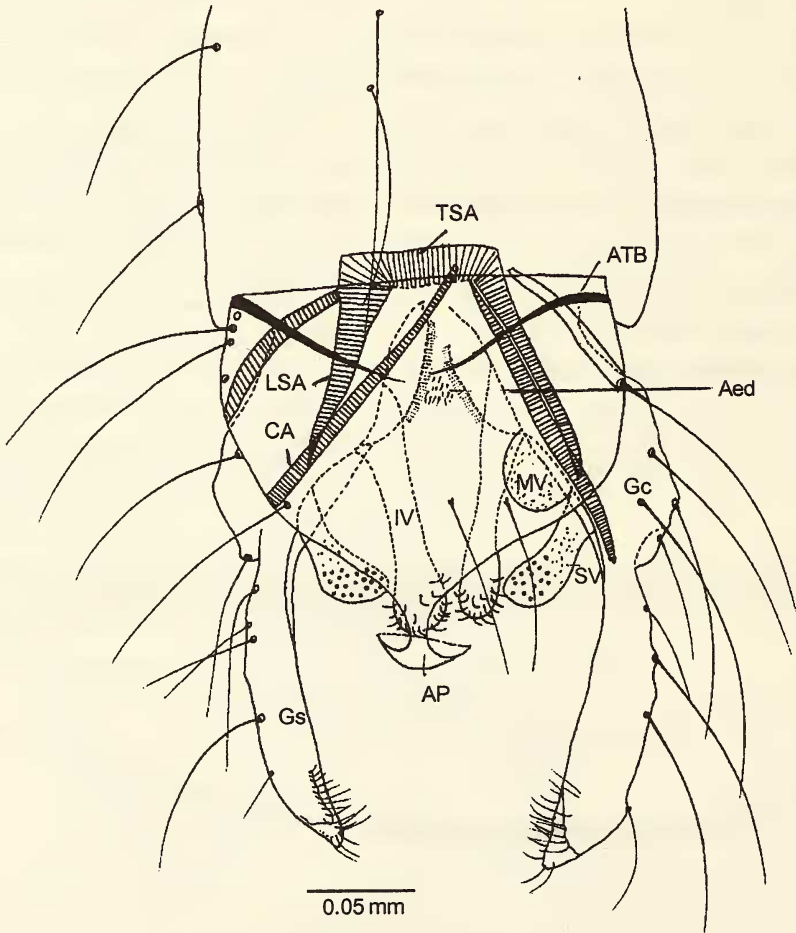


Fig. 3d: *Indoaxarus santokhi*: ♂ Genitalia

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TABLE 3
MEASUREMENTS OF LEGS (IN MM) AND LEG RATIO (LR) OF *INDOAXARUS SANTOKHI*

	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
P ₁	0.636	0.463	0.831	0.418	0.340	0.236	0.118	1.79
P ₂	0.640	0.590	0.309	0.159	0.068	0.127	0.063	0.52
P ₃	0.613	0.531	0.295	0.304	0.127	0.063	0.055	0.55

tubercle absent, squama fringed, pulvilli present, superior volsella very short, median volsella absent, gonostylus medially broadened. Genus *Axarus* can be diagnosed by anteprenotal lobes dorsally wide apart, scutum tubercle absent, anal lobe of wing absent, squama not fringed, pulvilli present, superior volsella flap-like, with forked and expanded microtrichia, median volsella absent. As apparent from the above discussion, the genus *Indoaxarus* has its own peculiarities and independent status.

Ecology and distribution: *Indoaxarus* was collected from a coastal pond in Port Blair (South Andaman Islands), while *Axarus* inhabits littoral and sublittoral soft sediment of rivers and lakes. *Xenochironomus* are obligate miners of fresh water sponges.

Phylogenetic considerations: In order to determine the validity of a newly proposed taxon above the species level, a cladistic analysis should be done. We have studied the phylogenetic position of the new genus within Family Chironomidae. The polarity of the characters have been determined by the following Out Group Comparison Method (Wiley 1981).

Previous investigations have not explicitly discussed the relationship of *Lindebergia* with the other Chironomidae. The genus is monobasic, in Subfamily Orthocladiinae, pars ventralis is present only in *Lindebergia* and some *Limnophyes*. This shows that the character is synapomorphic. The present analysis evaluated 12 characters and eight taxa, including a generalized outgroup based largely on the Simuliidae and Ceratopogonidae. Most multistate characters such as 1, 5 and 6 are coded as additive, as outgroup comparison permitted

TABLE 4
CHARACTERS AND ALTERNATE STATES USED IN CLADISTIC ANALYSIS

1. Antenna	0. ♂ antenna plumose 1. ♂ antenna poorly plumose 2. ♂ antenna pilose
2. Coronal suture	0. Coronal suture complete 1. Coronal suture incomplete 2. Coronal suture very poorly developed.
3. Median volsella	0. Median volsella absent 1. Median volsella present
4. Eyes	0. Eyes bare 1. Eyes hairy
5. Maxillary palp	0. Maxillary palp with 4 palpomeres 1. Maxillary palp with 5 palpomeres 2. Maxillary palp with 3 palpomeres
6. Anteprenotal lobes	0. Anteprenotal lobes fused medially 1. Anteprenotal lobes with median notch 2. Anteprenotal lobes separated
7. Supra-alars	0. Supra-alars absent. 1. Supra-alars present
8. Squamae	0. Squama not fringed 1. Squama fringed
9. Pulvilli	0. Pulvilli absent 1. Pulvilli present
10. Post genital plate	0. Weakly developed 1. Well developed
11. Spermathecae	0. Without microtrichia 1. With microtrichia
12. Spermathecal duct	0. Spermathecal ducts without bulb before common opening. 1. Spermathecal ducts with bulb before common opening.

(0 = plesiomorphic; 1, 2 apomorphic)

logical arrangement in linear transformation series. Homoplasy is exhibited by characters 7, 8, 9. In case of *Indoaxarus* and *Axarus*, symplesiomorphy is shown by characters 4, 5 and 7. Autapomorphies, certain characters of male genitalia, such as volsella, provide no information

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TABLE 5
MATRIX OF CHARACTERS AND ALTERNATE STATES USED IN THE CLADISTIC ANALYSIS (M=MALE, F=FEMALE, ?=UNKNOWN)

Taxon/Characters	1	2	3	4	5	6	7	8	9	10	11	12
Out group	0	0	0	0	0	0	0	0	0	0	0	0
<i>Indoaxarus</i>	1	0	1	0	1	0	1	0	0	?	?	?
<i>Axarus</i>	0	?	0	0	1	2	1	1	1	?	?	?
<i>Xenochironomus</i>	0	0	0	0	1	2	1	1	1	1	1	0
<i>Andamanus</i>	0	1	?	0	1	0	1	0	0	1	0	0
<i>Halocladius</i>	0	0	0	1	2	1	1	1	0	1	0	1
<i>Cricotopus</i>	0-2	0-1	0	1	0	1	0	1	0-1	0-1	1	1
<i>Semaphoront</i>	M	M+F	M	M+F	M+F	M+F	M+F	M+F	M+F	F	F	F

about relationship and were therefore excluded from the analysis. Character analysis resulted in a single tree with a few steps (Fig. 4).

Abbreviations used: Ar = Arolium, PM1-PM5 = Palpomeres 1-5, O = Orfice, La = Labia, PTP = Post tentorial pit, TN = Tentorium, OV = Outer verticals, CP = Cibarial pump, B = Brachiolum, Scf = Sensilla campaniformia, CO = cornua, Sq = Squama, A = Anal, Ti = Tibia, Ta1-Ta5 = Tarsal 1-5, Sca = Spermatheca, ScN = Spermathecal Neck, Sc Duct = Spermathecal duct, No = Notum, GCa = Gonocoxapodeme, Coa =

Coxasternapodeme, PGP = Post genital plate, CE = Cercus, Gp VIII = Gonapophysis VIII, Ra = Ramus, SPE = Spermathecal eminence, FT = Frontal tubercle, Aed = Aedeagus, ATB = Anal Tergal band, PV = Pars Ventralis, SVo = Superior volsella, MS = Mega Seta, CD = Crista dorsalis, CS = Coronal suture, T = Tentorium, VC = Ventral Comb, DC = Dorsal Comb, Em = Empodium, AP = Anal Point, MVo = Median volsella, IVo = Inferior volsella, TSA = Transverse sternapodeme, LSA = Lateral sternapodeme, R = radius, C = Costa, Sc = Subcosta, RM = Radiomedian.

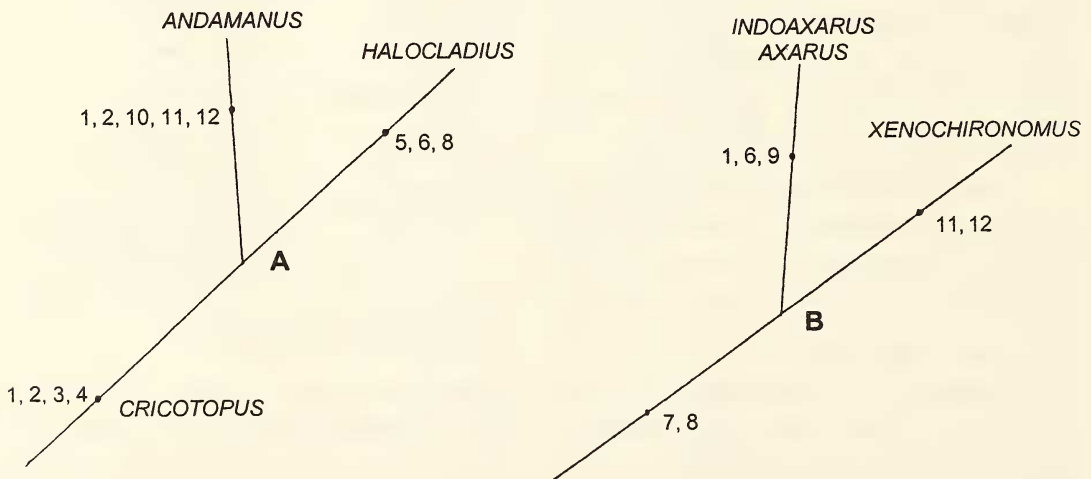


Fig. 4: Hypothesized phylogenetic relationship of new genera, *Indoaxarus* and *Andamanus* with other Chironomidae

NEW DESCRIPTIONS

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